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To Senator Felch
with the Respects

of W. Potter.

ADDRESS

TO THE

GOVERNMENT OF THE UNITED STATES

UPON THE MERITS OF

PIRSSON'S PATENT STEAM CONDENSER.

WASHINGTON:

GIDEON AND CO., PRINTERS.

1850.

AN ADDRESS
TO THE
GOVERNMENT OF THE UNITED STATES.

THE ATTENTION OF THE CONGRESS OF THE UNITED
STATES IS RESPECTFULLY INVITED TO

PIRSSON'S PATENT CONDENSER,

For Supplying the Boilers of Marine Engines with Fresh Water;
which will be found of the utmost importance to
their Steam Naval Marine.

✍ *This great invention can also be so arranged as to furnish an
adequate supply of perfectly pure fresh water for the
USE OF THE SHIP'S CREW, FOR
WASHING CLOTHES, &c., &c.*

*Patented in the United States, and the Kingdoms of Great Britain,
Holland, Belgium, Republic of France, &c., &c., &c.*

The importance of possessing an ample supply of fresh water, for the generation of steam as a motive power, is, to Engineers, and all others interested in the subject, well known. In the last few years, and at present, the use of steam as an agent for Marine purposes, has, and still continues to receive, considerable attention from those engaged in commercial enterprises, as well as our own and foreign Governments; to many the subject, as far at

least as detail is concerned, is entirely new, and the few remarks I am about to make are more particularly addressed to such persons. Although the subject under consideration relates to the *construction* of the steam engine, such parties may suppose *that* to be a matter with which they have little or nothing to do. Inasmuch, however, as great loss may follow from this supposition, I propose to give so much information as will be necessary to stimulate further investigation.

In all sea-going steamers the salt water of the ocean has hitherto necessarily been employed in the generation of steam for their engines. Numerous are the evils consequent upon this. One arises from its density, another from its *chemical* action, and both these are increased in their effects by the continuance of the process, for the steam generated from salt water will be perfectly *fresh*. As fast as water leaves a boiler in the form of steam, more must be sent in to supply its place; and this, in the old mode of working, has necessarily been from the ocean, and therefore *salt*: it is evident, then, that in a short time the water must become *saturated*; that is, when it can hold no more salt in solution; and the moment that point is passed the *excess* is immediately precipitated, in the solid state, on the flues and bottoms of boilers. There is a means, however, by which the precipitation of salt can be *partially*, though never wholly, prevented; and that is, by performing the operation known as "blowing off." This consists in discharging from the boiler, at certain regular intervals, a portion of the super-salted water, before it becomes fully saturated,* and introducing in its place a new supply of sea-water. But it will at once appear to the uninitiated as a very strange proceeding to throw away hot water, which represents a certain amount of *power* and *fuel*, to replace it with cold water, which has to be

*Sea-water becomes a saturated solution when the density of the brine is 12.33ds of its weight. The most favorable point at which to keep the water, is 2.33ds, to accomplish which an amount equal to one-half of the quantity required for making steam must be fed in and *blown out*!

heated, and again blown overboard! As engines have hitherto been constructed, however, there has been no possible alternative. As before remarked, the evil has been only palliated, not cured. The water in the boiler still remains more dense than it is in the sea; and of course in an increased degree, more dense than fresh water.

I propose now to state the several effects consequent upon this result. First, water holding impurities in solution does not attain the æriform state with the same facility as if pure; neither does it possess the same elastic force or power of propelling the engine with the same temperature, i. e., the same consumption of fuel; hence the amount of difference is the direct amount of loss; and the following statement will give some idea of what that amount is.

The elastic force of steam, generated from fresh water, as shown by the rise in a column of mercury, (the usual way of measuring the pressure of steam,) and that from salt water, is as follows:

The steam of fresh water, at 212° F.,		{ has an elastic force sufficient to raise a column of mercury }				30 inches.	
The steam from sea-water,	" 212° F.,	"	"	"	"	23.05 "	Loss, 6.95 in.
" fresh water,	" 216° F.,	"	"	"	"	32.5 "	
" sea-water,	" 216° F.,	"	"	"	"	24.6 "	Loss, 7.90 "
" fresh water,	" 220° F.,	"	"	"	"	35.1 "	
" sea water,	" 220° F.,	"	"	"	"	26.5 "	Loss, 8.51 "

This is at the ordinary density of ocean water, and shows a considerable difference, the last example exhibiting a loss of four and a quarter pounds pressure on each square inch of the piston. Taking, then, a common sized cylinder for marine engines, say seventy inches diameter, we should have, if fresh water were employed, and with the consumption of the same amount of fuel, a pressure of 16,354 pounds on the piston more than if in the case of salt water. This, however, is *below* the true calculation, for the density of the water taken is that of the sea, and is far less than of that contained in the boilers. Thus is shown the disadvantage in the use of salt water as regards *power*.

I shall now exhibit its action, in comparison with fresh water, upon the boilers and engines. On land in situations where pure

water can be had, numbers of boilers can be found which have been in constant use, under *high pressure steam*, for periods ranging from fifteen to twenty years, and are yet safe. In sea steamers it would be difficult to find any iron boilers seven years old; and if found, they would exhibit a spectacle of *craziness and patches*, wasteful in the extreme as to the use of fuel, and dangerous besides. A great majority reach this condition in less than five years; and *many* are worn out and become hazardous in two or three years use! The steamship Princeton's boilers, made of iron, were renewed after 3 years service. There are even instances where boilers have imperatively required extensive repairs at the end of the first voyage, by reason of the destroying character of sea-water. The rationale of this will now be briefly examined.

Sea-water in 1000 parts contains 25 of *chloride of sodium*; 5.3 *sulphate of magnesia*; 3.5 *chloride of magnesium*; 0.2 *carbonate of lime and magnesia*; 0.1 *sulphate of lime*, besides, in minute quantities, *sulphate and muriate of potash*, *iodide of sodium*, and *bromide of magnesium*. Iron appears to have a strong chemical affinity for some of these matters; and it is found, that the moment the water in the boiler has obtained a greater specific gravity than that of the sea, *deposit commences*, increasing in quantity as the density becomes greater. This deposit immediately adheres to the iron and coats it with a white crust, called *scale*. The *first* effect resulting will be the rapid oxidation or corrosion of the iron; and so firm is the union of the two, that nothing will remove the compound but a chisel or like instrument. This process is of itself very injurious, as it cuts away and weakens the iron; but there are many places in boilers where even this expedient cannot be resorted to, as under the flues, in the water legs and other intricate parts; and hence these parts are the first to yield, as clearly seen in the *numerous patches* applied to repair them. The next feature resulting from this, is the inability to generate the requisite supply of steam, arising from the fact, that the coating or scale is a *non-conductor of heat*, and the extent of the evil will be in proportion to the *thickness of this coating*, which varies in the same boiler, from that of a sheet of

paper, to three-quarters of an inch, or even more. If the only result of this were the increased consumption of fuel, it might appear unnecessary to allude to it so emphatically, but it is the forerunner of consequences far more momentous, viz., *liability to explosion, and that too without warning, or the possibility of calculating the time.* That occurs in this wise: When scale has formed, the water no longer comes in contact with the iron; the crust is a bad conductor of heat, and the iron attains a dangerously high temperature. If the scale is thick, the intense heat in the furnace (urged it may be, by a powerful artificial blast) will make such parts red-hot, sometimes, in a single minute. In this state, having no longer strength, it immediately yields to the internal pressure, and an explosion is the result. Where the scale, however, is not so thick as to produce this precise result, it yet causes the destruction of the iron, by what is called burning. In such cases the boilers are in an extremely dangerous condition, and repairs must always follow. The direct expense of making these is by no means the only cost, for there follows, what is to the *owners* far worse, *loss of time.* And startling as it may seem, *the time lost in making repairs, from damage by salt water alone, may be safely estimated at one-eighth of the whole existence of the ship.*

Repairing damages involves the necessity of suitable shops; and as these are found in comparatively but few places, and distant from each other, sea steamers are often under the necessity of going thousands of miles for what oftentimes will be mended in a week, as witness the case of the steam frigate Mississippi, Capt. Adams, which was compelled to leave the Gulf of Mexico, at a time when most wanted, to go to Norfolk for the purpose of having her boilers repaired, &c. All salt water is not alike in producing the before-mentioned bad effects, some being much worse than others. Such are the tropical seas: a steamer there can, with difficulty, keep down the deposit of salt, and numerous instances have occurred in which they have had to lie-to, have their boilers cooled down, opened, *and the salt shovelled out* as if from a factory, before she

could proceed. An engineer, lately from the Pacific, has stated, that as far as he could learn there was not a steamer there with boilers in *complete order*, and yet nearly all of those vessels are *new*.

In a communication of the 18th of June, made to the Hon. the Secretary of the Navy by Mr. Haswell, the Engineer-in-chief, he says:

“Of the value of this instrument, (Pirsson’s condenser,) if successfully applied in the naval service, a fair appreciation of the benefits involved may be had in a consideration of the following elements:

1st. The saving in the consumption of fuel; *for equal pressures* of steam will reach from 8 to 12 per cent. It will also enable *high* steam to be used, *by which a further economy of it (fuel)* may be had in an increased expansion of it.

2d. The cost of repairs to boilers will *be reduced more than one half*.

3d. The necessity of using copper as the material of construction will be dispensed with.

4th. The duration of iron boilers will be extended from 4 or 5 to 9 years.

5th. The *weights of boilers*, similar in design with those to be used with salt water, will *be reduced 20 per cent*.

6th. The use of fresh water will enable tubular boilers to be used; which are the most economical, in space occupied, weight of material, and *in fuel consumed*.

7th. The use of fresh water by condensation will preclude the formation of scale; which will effect *a very material economy of fuel, and reduce the danger from injury to boilers by their being overheated*.

8th. The absence of scale in steam boilers, and the saving of time otherwise lost in effecting repairs to boilers, will *render a steamer more effective, and will extend her term of service far beyond any time that has yet been attained*.

In fine, the successful introduction of fresh water into the boil-

ers of marine steamers, is the most interesting feature that is now presented to the consideration of the profession; and in consideration of its affording economy of fuel and increased duration of the operation of a boiler, it is of more value to the naval than to the merchant service."

If there be so many advantages resulting from the use of fresh water in the generation of steam, as the Engineer-in-chief recapitulates, surely, then, no means should be left untried to procure it.

Economy in our naval service is essential to its prosperity and well-being, but the hand of penury may be equally fatal to it. Thousands of dollars may be annually saved by the adoption of this important improvement, the efficiency and greater duration of the vessel ensured, and the safety of human life and the national honor may be the better guarded.

Copy of a letter from Commodore Charles Stewart, U. States Navy, to a friend in Washington.

PHILADELPHIA, June 26, 1850.

MY DEAR SIR: I hope that you will not forget to bring to the notice of the Hon. the Secretary of the Navy, the importance of adopting Pirsson's condenser for our national steamers. I regret indeed, that the steamship Mississippi was permitted to leave for the Mediterranean before that great invention was applied to her.

There has been no improvement conferred on sea-going steamers equal in value to the Pirsson condenser. The scientific world has been many years endeavoring to discover the means of substituting fresh water for salt, for the use of the boilers of sea-going vessels, but have hitherto failed; and the consequence has been, that the boilers of war steamers, as well as those of the mercantile marine, have been constantly subject to heavy repairs; and the delays incident thereupon have been severely felt, to say nothing of the enormous expense which has attended them.

I hope, therefore, that you will not fail to urge the Secretary of the Navy to direct this condenser to be constructed for the engines of the steamers now building.

I am, very truly, yours,
(Signed)

CHA'S STEWART.

Practical evidence of the merits of Pirsson's Condenser.

PHILADELPHIA, May 17th, 1850.

J. P. PIRSSON, esq.:

DEAR SIR: It gives me pleasure to state, that your patent condenser has fully met our expectations, and given entire satisfaction on board the steamship Osprey.

On her voyage out from Philadelphia she has carried her fresh water in the boilers to Charleston, without once blowing off, saving thereby largely in consumption of fuel. At Charleston the engineer let the water out of the boilers to examine them, and wash out any sediment* which might have been deposited from any uncleanness of water; and, therefore, on his return trip salt water was taken in at Charleston, but so perfect is the condensation and *evaporation*, for supply of water, that the salt water was worked into *fresh* before they reached the Capes of Delaware. Under these circumstances, of course, no scale was anticipated in the boilers, and none was found of any kind on examination, on the return from the first voyage. No farther examination was made for scale until the end of the third voyage, when there was not the slightest trace of deposit of salt, scale, or sediment of any kind, the iron being as clean as the day it was put in. This result is, of course, highly satisfactory to us, and must be gratifying to you. We are now preparing to build a second steamship, and shall put in your patent condenser.

Very respectfully,

A. W. THOMPSON,

President of Philadelphia and Atlantic Steam Navigation Co.

* That is from dirt left by the workmen, and to be found in all new boilers.—J. P. P.

PHILADELPHIA, *May 11th*, 1850.

J. P. PIRSSON, esq.:

DEAR SIR: To your queries respecting the operation of your new patent condenser for supplying the boilers of marine engines with fresh water, I have this report to make as to its actual operation on board our ship:

We have now made several voyages since its attachment to our engine; and from the first moment that we applied steam to it until now, it has done all you claimed for it, viz., furnishing our boilers with an abundant supply of fresh water of the purest character, so that now, after having been several times in tropical seas, I have found the boilers as bright and clean as the day they were finished. To be able to bear testimony to the above, would, I apprehend, be sufficient to establish the claim of value which would undoubtedly attach to any successful invention for this purpose. But in my opinion, to rest here would be stopping far short of what is due to your discovery. For, besides furnishing, as above stated, an ample supply of fresh water, it also greatly increases the efficiency of the engine, by giving us a much better vacuum, and enabling us to get a more abundant supply of steam than before.* For I am satisfied had we been using salt water, (without blowers, as at present,) we should have found it, *at times*, difficult to proceed. Another distinguishing feature in your invention, and to my mind one of no little importance, is, that you do not change the general structure of the engine, or require any new modes of operating it. Your invention gives me no trouble, but on the contrary saves me and the hands much work, not to mention, in addition, the economy of fuel, which is considerable.

In conclusion, I will say, that your apparatus came on board amid doubts and fears from all hands; now, no argument that I know of could get it out of the ship; and I should be sorry to go

* Although the vacuum is better, yet that is not the *only* reason of the *increased power of the engine*. See remarks on that subject in the introduction.—J. P. P.

to sea in any vessel not thus supplied. With my hearty recommendations of it to all interested in ocean steam navigation, and with every wish for your success,

I remain, yours, respectfully,

GEO. F. COFFEE,
Engineer of Steamship Osprey.

PHILADELPHIA, *May 4th*, 1850.

J. P. PIRSSON, esq.

DEAR SIR: In answer to your inquiry how your condenser, now on board the steamer *Osprey*, running between this port and Charleston, operates, I am happy to say, that from the first trial up to the present time it has given entire satisfaction; it has never for a moment failed in its operation, and the vacuum is regularly maintained at twenty-six inches, and the water produced by condensation returned to the boilers at 100 to 110°. The condenser and evaporator are fully tested on board the *Osprey*, as follows: Here they fill the boilers with fresh water, which they carry to Charleston; on their arrival there it is necessary to let out the water, to cool down, so as to clean furnaces and flues, and as they cannot fill up with fresh water, they do so with salt; as soon as they start from Charleston the evaporator is put in operation, and the fresh water produced sent into the boilers. You are well aware, that sea-water of ordinary density and temperature produces no deposit on the internal surface of a boiler; the *Osprey* only has sea-water in her boilers while she is at the wharf at Charleston, after the flues are cleaned, say six hours; the evaporator then gradually reduces the density of the water in her boilers, so that in thirty hours out it is quite fresh; and on her arrival at the Capes it cannot be distinguished from the Delaware water. The internal surfaces are *perfectly* clean, and have not been touched since she started, while in the old boilers they required to be cleaned often.

Your condenser must, I think, commend itself to general favor, for the reason that there is no contingency connected with it that can cause any delay to the engine; for if we suppose that the fresh water part should entirely give out, the ordinary condenser still remains uninjured. I am well satisfied, however, that there is no part of the condenser but will last as long as the rest of the engine.

Yours, truly,

B. H. BARTOL,
Chief Engineer, &c.

OFFICE OF THE PHILADELPHIA AND
ATLANTIC STEAM NAVIGATION CO.

PHILADELPHIA, *May 15th*, 1850.

J. P. PIRSSON, esq., New York.

DEAR SIR: I hardly know what to say in answer to your request for my opinion of your patent condenser for supplying fresh water to the boilers of marine engines, lately put to the engines of the steam ship *Osprey*, owned by our company. My opinion is to reiterate, what as far as I learn is the same with all, *Commander, Engineers, and our Company*, viz., that it has proved eminently successful; and, also, the consumption of *fuel* has been greatly reduced. The advantages attendant upon the use of fresh water for the generation of steam, which is undoubtedly great, are all obtained by your invention, and this, too, without complicating, or in any way endangering the operations of the other parts of the engine.

Much more I could say, and *will*, if you wish it. But of this I assure you, if I owned ten steamships, your invention should form a part of every one of them.

I am, very truly, your obedient servant,

JOHN L. LINTON,
Treasurer.

FRANKLIN WORKS, PHILADELPHIA,

May 29th, 1850.

Mr. J. P. PIRSSON.

DEAR SIR: Your favor of 24th inst., duly at hand, we immediately brought the matter referred to before the parties, on whom we urged the importance of your invention, and at our solicitation they have ordered it. Please prepare the necessary calculations and instructions, as soon as possible, that we may get the work under way. Make your estimate so as to give us an ample supply of fresh water for the ship's use also, if at any time it should be found necessary.

Respectfully, yours,

JAMES T. SUTTON & CO.

 NEW YORK, *May 30th, 1850.*

J. P. PIRSSON, esq.

DEAR SIR: We are glad to learn that you have put your excellent invention for supplying the boilers of marine engines with fresh water into operation, on a scale commensurate with its importance; and, also, that you have realized all you expected by its successful performance. We never had the least doubt of its accomplishing the end you had in view at the time of its invention, when you presented your drawings of the same for our consideration and aid in obtaining its introduction. You may remember we urged its adoption in a steamer we were then putting an engine into, but the depressed state of things at that time* discouraged the owners from applying it, because of the increased cost, notwithstanding, we gave it as our opinion, that the difference of *saving in fuel alone* would pay for it in a few months use. There seems to be, at present, a disposition on the part of owners of steamers to pay reasonably for any improvement saving fuel, and for the preser-

 *Spring of 1846.—J. P. P.

vation of boilers; *both of which your invention accomplishes.* You will, therefore, please send us the cost of your patent condenser per cubic foot of cylinder, carrying 15 lbs. to the inch, and cutting the steam off at half stroke, and oblige,

Yours, respectfully,

H. R. DUNHAM & CO.,

Archimedes Works.

WASHINGTON, D. C., *August 8, 1850.*

DEAR SIR: I was much gratified to learn, during my recent visit to Philadelphia, that your Patent Steam Condenser had proven itself every thing which I had predicted. Prior to its application to the steamship *OSPREY*, (when in model,) I was satisfied with its excellence and great value. It will doubtless effect a great and useful improvement in ocean steam navigation. By it the expense of maintaining ocean steamers will be vastly reduced, and no steamer with fuel on board need be without fresh water at sea for the use of the crew, &c.

Your condenser will cause the same amount of fuel to do *one-third more work* in the propulsion of vessels at sea, and it will double the durability of their iron boilers—consequently rendering the boilers less liable to accident from irregular corrosion; and one-third of the tonnage of the vessel, which is saved by economizing fuel, will be available for paying freight.

In war steamers the advantage gained by the use of your condenser is so self-evident that it should be universally adopted. Its perfect success on board the *Osprey* has conclusively proven its merits and great value.

I am, very respectfully, &c., your obedient servant,

WM. W. HUNTER, *U. S. Navy*

J. P. PIRSSON, esq., *New York.*

The recommendation of Wm. Sewell, esq., a Chief Engineer of the United States Navy, to Capt. W. W. Hunter, U. S. N.

PORTSMOUTH, VA.,

August 12, 1850.

DEAR SIR: I have taken the liberty of addressing you on a subject of great importance. I refer to using fresh water in the boiler of the steamer you are now constructing.

I have always considered it of the highest importance to accomplish this object; but all the arrangements used heretofore have had some serious objections that were nearly or quite equal to the benefits derived from the use of the fresh water. You are aware of the use of Hall's and Ericsson's, and perhaps some others.

There has been a condenser put into the "Osprey," and I have letters from the owners, and from the foreman of Messrs. Merrick & Son, stating that it has worked most successfully, and in which I have full confidence myself, as *it*, in my opinion, *removes all the objections to those named above, and will save at least two-thirds*, if not the whole cost of its application on the passage out, as you may calculate on a saving of about 20 *per cent. of fuel*.

This alone will be a most important item, both in saving the cost of the fuel, and in the greater distance that can be accomplished with the same amount. Then there is greater safety to the boiler, increased durability of it, and a saving in repairs, &c., as well as the certainty of keeping in order.



The saving of 20 per cent. of fuel, where coal is from 30 to 40 dollars per ton, will be a very important consideration, besides saving in the labor in handling as well as in the cost.

I think you will see the importance of it. It is patented by Joseph P. Pirsson of No. 5, Wall street, New York; it is not very expensive, a considerable part of it being cast iron."

Truly, yours, &c.,

WILLIAM SEWELL.

Capt. WM. W. HUNTER, *U. S. Navy.*



ADDITIONAL AND FRESH

EVIDENCE OF THE PRACTICAL WORKING OF

PIRSSON'S STEAM CONDENSER.

✍ FOR FURNISHING AN AMPLE AND CONTINUOUS SUPPLY OF PURE FRESH WATER FOR THE BOILERS OF OCEAN STEAMERS AND FOR THE USE OF PASSENGERS AND CREW; AND IT IS THE ONLY SUCCESSFUL APPARATUS KNOWN TO MAN.

1. A CLEAR SAVING OF ONE HALF THE COST OF MAINTAINING STEAM WAR VESSELS:
2. NO EXPLOSION OF BOILERS:
3. GREATER EFFICIENCY OF ENGINE AND DURATION OF VESSEL AND MACHINERY SECURED:
4. ONE FOURTH LESS BOILER ROOM REQUIRED.
5. **FROM 2 TO 300,000 DOLLARS PER ANNUM SAVED ON THE PRESENT STEAM VESSELS OF THE NAVY.**

✍ SEE TESTIMONIALS APPENDED, AND
DECISION OF PATENT CASE.

WASHINGTON:

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our own and foreign Governments; to many the subject, as far at

least as detail is concerned, is entirely new, and the few remarks I am about to make are more particularly addressed to such persons. Although the subject under consideration relates to the *construction* of the steam engine, such parties may suppose *that* to be a matter with which they have little or nothing to do. Inasmuch, however, as great loss may follow from this supposition, I propose to give so much information as will be necessary to stimulate further investigation.

In all sea-going steamers the salt water of the ocean has hitherto necessarily been employed in the generation of steam for their engines. Numerous are the evils consequent upon this. One arises from its density, another from its *chemical* action, and both these are increased in their effects by the continuance of the process, for the steam generated from salt water will be perfectly *fresh*. As fast as water leaves a boiler in the form of steam, more must be sent in to supply its place; and this, in the old mode of working, has necessarily been from the ocean, and therefore *salt*: it is evident, then, that in a short time the water must become *saturated*; that is, when it can hold no more salt in solution; and the moment that point is passed the *excess* is immediately precipitated, in the solid state, on the flues and bottoms of boilers. There is a means, however, by which the precipitation of salt can be *partially*, though never wholly, prevented; and that is, by performing the operation known as "blowing off." This consists in discharging from the boiler, at certain regular intervals, a portion of the super-salted water, before it becomes fully saturated;* and introducing in its place a new supply of sea-water. But it will at once appear to the uninitiated as a very strange proceeding to throw away hot water, which represents a certain amount of *power* and *fuel*, to replace it with cold water, which has to be

*Sea-water becomes a saturated solution when the density of the brine is 12.33ds of its weight. The most favorable point at which to keep the water, is 2.33ds, to accomplish which an amount equal to one-half of the quantity required for making steam must be fed in and *blown out*!

heated, and again blown overboard! As engines have hitherto been constructed, however, there has been no possible alternative. As before remarked, the evil has been only palliated, not cured. The water in the boiler still remains more dense than it is in the sea; and of course in an increased degree, more dense than fresh water.

I propose now to state the several effects consequent upon this result. First, water holding impurities in solution does not attain the æriform state with the same facility as if pure; neither does it possess the same elastic force or power of propelling the engine with the same temperature, i. e., the same consumption of fuel; hence the amount of difference is the direct amount of loss; and the following statement will give some idea of what that amount is.

The elastic force of steam, generated from fresh water, as shown by the rise in a column of mercury, (the usual way of measuring the pressure of steam,) and that from salt water, is as follows:

The steam of fresh water, at 212° F.,						{ has an elastic force sufficient } { to raise a column of mercury } 30 inches.	
The steam from sea-water,	"	212° F.,	"	"	"	23.05 "	Loss, 6.95 in.
"	fresh water,	"	216° F.,	"	"	32.5 "	
"	sea-water,	"	216° F.,	"	"	24.6 "	Loss, 7.90 "
"	fresh water,	"	220° F.,	"	"	35.1 "	
"	sea-water,	"	220° F.,	"	"	26.5 "	Loss, 8.51 "

This is at the ordinary density of ocean water, and shows a considerable difference, the last example exhibiting a loss of four and a quarter pounds pressure on each square inch of the piston. Taking, then, a common sized cylinder for marine engines, say seventy inches diameter, we should have, if fresh water were employed, and with the consumption of the same amount of fuel, a pressure of 16,354 pounds on the piston more than if in the case of salt water. This, however, is *below* the true calculation, for the density of the water taken is that of the sea, and is far less than of that contained in the boilers. Thus is shown the disadvantage in the use of salt water as regards *power*.

I shall now exhibit its action, in comparison with fresh water, upon the boilers and engines. On land in situations where pure

water can be had, numbers of boilers can be found which have been in constant use, under *high pressure steam*, for periods ranging from fifteen to twenty years, and are yet safe. In sea steamers it would be difficult to find any iron boilers seven years old; and if found, they would exhibit a spectacle of *craziness and patches*, wasteful in the extreme as to the use of fuel, and dangerous besides. A great majority reach this condition in less than five years; and *many* are worn out and become hazardous in two or three years use! The steamship Princeton's boilers, made of iron, were renewed after 3 years service. There are even instances where boilers have imperatively required extensive repairs at the end of the first voyage, by reason of the destroying character of sea-water. The rationale of this will now be briefly examined.

Sea-water in 1000 parts contains 25 of *chloride of sodium*; 5.3 *sulphate of magnesia*; 3.5 *chloride of magnesium*; 0.2 *carbonate of lime and magnesia*; 0.1 *sulphate of lime*, besides, in minute quantities, *sulphate and muriate of potash, iodide of sodium, and bromide of magnesium*. Iron appears to have a strong chemical affinity for some of these matters; and it is found, that the moment the water in the boiler has obtained a greater specific gravity than that of the sea, *deposit commences*, increasing in quantity as the density becomes greater. This deposit immediately adheres to the iron and coats it with a white crust, called *scale*. The *first* effect resulting will be the rapid oxidation or corrosion of the iron; and so firm is the union of the two, that nothing will remove the compound but a chisel or like instrument. This process is of itself very injurious, as it cuts away and weakens the iron; but there are many places in boilers where even this expedient cannot be resorted to, as under the flues, in the water legs and other intricate parts; and hence these parts are the first to yield, as clearly seen in the *numerous patches* applied to repair them. The next feature resulting from this, is the inability to generate the requisite supply of steam, arising from the fact, that the coating or scale is a *non-conductor of heat*, and the extent of the evil will be in proportion to the *thickness of this coating*, which varies in the same boiler, from that of a sheet of

paper, to three-quarters of an inch, or even more. If the only result of this were the increased consumption of fuel, it might appear unnecessary to allude to it so emphatically, but it is the forerunner of consequences far more momentous, viz., *liability to explosion, and that too without warning, or the possibility of calculating the time.* That occurs in this wise: When scale has formed, the water no longer comes in contact with the iron; the crust is a bad conductor of heat, and the iron attains a dangerously high temperature. If the scale is thick, the intense heat in the furnace (urged it may be, by a powerful artificial blast) will make such parts red-hot, sometimes, in a single minute. In this state, having no longer strength, it immediately yields to the internal pressure, and an explosion is the result. Where the scale, however, is not so thick as to produce this precise result, it yet causes the destruction of the iron, by what is called burning. In such cases the boilers are in an extremely dangerous condition, and repairs must always follow. The direct expense of making these is by no means the only cost, for there follows, what is to the owners far worse, *loss of time.* And startling as it may seem, *the time lost in making repairs, from damage by salt water alone, may be safely estimated at one-eighth of the whole existence of the ship.*

Repairing damages involves the necessity of suitable shops; and as these are found in comparatively but few places, and distant from each other, sea steamers are often under the necessity of going thousands of miles for what oftentimes will be mended in a week, as witness the case of the steam frigate Mississippi, Capt. Adams, which was compelled to leave the Gulf of Mexico, at a time when most wanted, to go to Norfolk for the purpose of having her boilers repaired, &c. All salt water is not alike in producing the before-mentioned bad effects, some being much worse than others. Such are the tropical seas: a steamer there can, with difficulty, keep down the deposit of salt, and numerous instances have occurred in which they have had to lie-to, have their boilers cooled down, opened, *and the salt shovelled out* as if from a factory, before she

could proceed. An engineer, lately from the Pacific, has stated, that as far as he could learn there was not a steamer there with boilers in *complete order*, and yet nearly all of those vessels are *new*.

In a communication of the 18th of June, made to the Hon. the Secretary of the Navy by Mr. Haswell, the Engineer-in-chief, he says:

“Of the value of this instrument, (Pirsson’s condenser,) if successfully applied in the naval service, a fair appreciation of the benefits involved may be had in a consideration of the following elements:

1st. The saving in the consumption of fuel; *for equal pressures* of steam will reach from 8 to 12 per cent. It will also enable *high* steam to be used, *by which a further economy of it (fuel)* may be had in an increased expansion of it.

2d. The cost of repairs to boilers will *be reduced more than one half*.

3d. The necessity of using copper as the material of construction will be dispensed with.

4th. The duration of iron boilers will be extended from 4 or 5 to 9 years.

5th. The *weights of boilers*, similar in design with those to be used with salt water, will *be reduced 20 per cent*.

6th. The use of fresh water will enable tubular boilers to be used; which are the most economical, in space occupied, weight of material, and *in fuel consumed*.

7th. The use of fresh water by condensation will preclude the formation of scale; which will effect *a very material economy of fuel, and reduce the danger from injury to boilers by their being overheated*.

8th. The absence of scale in steam boilers, and the saving of time otherwise lost in effecting repairs to boilers, will *render a steamer more effective, and will extend her term of service far beyond any time that has yet been attained*.

In fine, the successful introduction of fresh water into the boil-

ers of marine steamers, is the most interesting feature that is now presented to the consideration of the profession; and in consideration of its affording economy of fuel and increased duration of the operation of a boiler, it is of more value to the naval than to the merchant service.”

If there be so many advantages resulting from the use of fresh water in the generation of steam, as the Engineer-in-chief recapitulates, surely, then, no means should be left untried to procure it.

Economy in our naval service is essential to its prosperity and well-being, but the hand of penury may be equally fatal to it. Thousands of dollars may be annually saved by the adoption of this important improvement, the efficiency and greater duration of the vessel ensured, and the safety of human life and the national honor may be the better guarded.

Copy of a letter from Commodore Charles Stewart, U. States Navy, to a friend in Washington.

PHILADELPHIA, June 26, 1850.

MY DEAR SIR: I hope that you will not forget to bring to the notice of the Hon. the Secretary of the Navy, the importance of adopting Pirsson's condenser for our national steamers. I regret indeed, that the steamship Mississippi was permitted to leave for the Mediterranean before that great invention was applied to her.

There has been no improvement conferred on sea-going steamers equal in value to the Pirsson condenser. The scientific world has been many years endeavoring to discover the means of substituting fresh water for salt, for the use of the boilers of sea-going vessels, but have hitherto failed; and the consequence has been, that the boilers of war steamers, as well as those of the mercantile marine, have been constantly subject to heavy repairs; and the delays incident thereupon have been severely felt, to say nothing of the enormous expense which has attended them.

I hope, therefore, that you will not fail to urge the Secretary of the Navy to direct this condenser to be constructed for the engines of the steamers now building.

I am, very truly, yours,

(Signed)

CHA'S STEWART.

Practical evidence of the merits of Pirsson's Condenser.

PHILADELPHIA, May 17th, 1850.

J. P. PIRSSON, esq.:

DEAR SIR: It gives me pleasure to state, that your patent condenser has fully met our expectations, and given entire satisfaction on board the steamship Osprey.

On her voyage out from Philadelphia she has carried her fresh water in the boilers to Charleston, without once blowing off, saving thereby largely in consumption of fuel. At Charleston the engineer let the water out of the boilers to examine them, and wash out any sediment* which might have been deposited from any uncleanness of water; and, therefore, on his return tips salt water was taken in at Charleston, but so perfect is the condensation and *evaporation*, for supply of water, that the salt water was worked into *fresh* before they reached the Capes of Delaware. Under these circumstances, of course, no scale was anticipated in the boilers, and none was found of any kind on examination, on the return from the first voyage. No farther examination was made for scale until the end of the third voyage, when there was not the slightest trace of deposit of salt, scale, or sediment of any kind, the iron being as clean as the day it was put in. This result is, of course, highly satisfactory to us, and must be gratifying to you. We are now preparing to build a second steamship, and shall put in your patent condenser.

Very respectfully,

A. W. THOMPSON,

President of Philadelphia and Atlantic Steam Navigation Co.

* That is from dirt left by the workmen, and to be found in all new boilers.—J. P. P.

PHILADELPHIA, *May 11th*, 1850.

J. P. PIRSSON, esq.:

DEAR SIR: To your queries respecting the operation of your new patent condenser for supplying the boilers of marine engines with fresh water, I have this report to make as to its actual operation on board our ship:

We have now made several voyages since its attachment to our engine; and from the first moment that we applied steam to it until now, it has done all you claimed for it, viz., furnishing our boilers with an abundant supply of fresh water of the purest character, so that now, after having been several times in tropical seas, I have found the boilers as bright and clean as the day they were finished. To be able to bear testimony to the above, would, I apprehend, be sufficient to establish the claim of value which would undoubtedly attach to any successful invention for this purpose. But in my opinion, to rest here would be stopping far short of what is due to your discovery. For, besides furnishing, as above stated, an ample supply of fresh water, it also greatly increases the efficiency of the engine, by giving us a much better vacuum, and enabling us to get a more abundant supply of steam than before.* For I am satisfied had we been using salt water, (without blowers, as at present,) we should have found it, *at times*, difficult to proceed. Another distinguishing feature in your invention, and to my mind one of no little importance, is, that you do not change the general structure of the engine, or require any new modes of operating it. Your invention gives me no trouble, but on the contrary saves me and the hands much work, not to mention, in addition, the economy of fuel, which is considerable.

In conclusion, I will say, that your apparatus came on board amid doubts and fears from all hands; now, no argument that I know of could get it out of the ship; and I should be sorry to go

* Although the vacuum is better, yet that is not the *only* reason of the *increased power* of the engine. See remarks on that subject in the introduction.—J. P. P.

to sea in any vessel not thus supplied. With my hearty recommendations of it to all interested in ocean steam navigation, and with every wish for your success,

I remain, yours, respectfully,

GEO. F. COFFEE,
Engineer of Steamship Osprey.

PHILADELPHIA, *May 4th*, 1850.

J. P. PIRSSON, esq.

DEAR SIR: In answer to your inquiry how your condenser, now on board the steamer *Osprey*, running between this port and Charleston, operates, I am happy to say, that from the first trial up to the present time it has given entire satisfaction; it has never for a moment failed in its operation, and the vacuum is regularly maintained at twenty-six inches, and the water produced by condensation returned to the boilers at 100 to 110°. The condenser and evaporator are fully tested on board the *Osprey*, as follows: Here they fill the boilers with fresh water, which they carry to Charleston; on their arrival there it is necessary to let out the water, to cool down, so as to clean furnaces and flues, and as they cannot fill up with fresh water, they do so with salt; as soon as they start from Charleston the evaporator is put in operation, and the fresh water produced sent into the boilers. You are well aware, that sea-water of ordinary density and temperature produces no deposit on the internal surface of a boiler; the *Osprey* only has sea-water in her boilers while she is at the wharf at Charleston, after the flues are cleaned, say six hours; the evaporator then gradually reduces the density of the water in her boilers, so that in thirty hours out it is quite fresh; and on her arrival at the Capes it cannot be distinguished from the Delaware water. The internal surfaces are *perfectly* clean, and have not been touched since she started, while in the old boilers they required to be cleaned often.

Your condenser must, I think, commend itself to general favor, for the reason that there is no contingency connected with it that can cause any delay to the engine; for if we suppose that the fresh water part should entirely give out, the ordinary condenser still remains uninjured. I am well satisfied, however, that there is no part of the condenser but will last as long as the rest of the engine.

Yours, truly,

B. H. BARTOL,
Chief Engineer, &c.

OFFICE OF THE PHILADELPHIA AND
ATLANTIC STEAM NAVIGATION CO.

PHILADELPHIA, *May 15th*, 1850.

J. P. PIRSSON, esq., New York.

DEAR SIR: I hardly know what to say in answer to your request for my opinion of your patent condenser for supplying fresh water to the boilers of marine engines, lately put to the engines of the steam ship *Osprey*, owned by our company. My opinion is to reiterate, what as far as I learn is the same with all, *Commander, Engineers, and our Company*, viz., that it has proved eminently successful; and, also, the consumption of *fuel* has been greatly reduced. The advantages attendant upon the use of fresh water for the generation of steam, which is undoubtedly great, are all obtained by your invention, and this, too, without complicating, or in any way endangering the operations of the other parts of the engine.

Much more I could say, and *will*, if you wish it. But of this I assure you, if I owned ten steamships, your invention should form a part of every one of them.

I am, very truly, your obedient servant,

JOHN L. LINTON,
Treasurer.

FRANKLIN WORKS, PHILADELPHIA,

May 29th, 1850.

Mr. J. P. PIRSSON.

DEAR SIR: Your favor of 24th inst., duly at hand, we immediately brought the matter referred to before the parties, on whom we urged the importance of your invention, and at our solicitation they have ordered it. Please prepare the necessary calculations and instructions, as soon as possible, that we may get the work under way. Make your estimate so as to give us an ample supply of fresh water for the ship's use also, if at any time it should be found necessary.

Respectfully, yours,

JAMES T. SUTTON & CO.

 NEW YORK, *May 30th, 1850.*

J. P. PIRSSON, esq.

DEAR SIR: We are glad to learn that you have put your excellent invention for supplying the boilers of marine engines with fresh water into operation, on a scale commensurate with its importance; and, also, that you have realized all you expected by its successful performance. We never had the least doubt of its accomplishing the end you had in view at the time of its invention, when you presented your drawings of the same for our consideration and aid in obtaining its introduction. You may remember we urged its adoption in a steamer we were then putting an engine into, but the depressed state of things at that time* discouraged the owners from applying it, because of the increased cost, notwithstanding, we gave it as our opinion, that the difference of *saving in fuel alone* would pay for it in a few months use. There seems to be, at present, a disposition on the part of owners of steamers to pay reasonably for any improvement saving fuel, and for the preser-

 *Spring of 1846.—J. P. P.

vation of boilers; *both of which your invention accomplishes.*
 You will, therefore, please send us the cost of your patent condenser per cubic foot of cylinder, carrying 15 lbs. to the inch, and cutting the steam off at half stroke, and oblige,

Yours, respectfully,

H. R. DUNHAM & CO.,

Archimedes Works.

WASHINGTON, D. C., *August 8, 1850.*

DEAR SIR: I was much gratified to learn, during my recent visit to Philadelphia, that your Patent Steam Condenser had proven itself every thing which I had predicted. Prior to its application to the steamship OSPREY, (when in model,) I was satisfied with its excellence and great value. It will doubtless effect a great and useful improvement in ocean steam navigation. By it the expense of maintaining ocean steamers will be vastly reduced, and no steamer with fuel on board need be without fresh water at sea for the use of the crew, &c.

Your condenser will cause the same amount of fuel to do *one-third more work* in the propulsion of vessels at sea, and it will double the durability of their iron boilers—consequently rendering the boilers less liable to accident from irregular corrosion; and one-third of the tonnage of the vessel, which is saved by economizing fuel, will be available for paying freight.

In war steamers the advantage gained by the use of your condenser is so self-evident that it should be universally adopted. Its perfect success on board the Osprey has conclusively proven its merits and great value.

I am, very respectfully, &c., your obedient servant,

WM. W. HUNTER, *U. S. Navy*

J. P. PIRSSON, esq., *New York.*

The recommendation of Wm. Sewell, esq., a Chief Engineer of the United States Navy, to Capt. W. W. Hunter, U. S. N.

PORTSMOUTH, VA.,

August 12, 1850.

DEAR SIR: I have taken the liberty of addressing you on a subject of great importance. I refer to using fresh water in the boiler of the steamer you are now constructing.

I have always considered it of the highest importance to accomplish this object; but all the arrangements used heretofore have had some serious objections that were nearly or quite equal to the benefits derived from the use of the fresh water. You are aware of the use of Hall's and Ericsson's, and perhaps some others.

There has been a condenser put into the "Osprey," and I have letters from the owners, and from the foreman of Messrs. Merrick & Son, stating that it has worked most successfully, and in which I have full confidence myself, as *it, in my opinion, removes all the objections to those named above, and will save at least two-thirds*, if not the whole cost of its application on the passage out, as you may calculate on a saving of about 20 *per cent. of fuel*.

This alone will be a most important item, both in saving the cost of the fuel, and in the greater distance that can be accomplished with the same amount. Then there is greater safety to the boiler, increased durability of it, and a saving in repairs, &c., as well as the certainty of keeping in order.

The saving of 20 per cent. of fuel, where coal is from 30 to 40 dollars per ton, will be a very important consideration, besides saving in the labor in handling as well as in the cost.

I think you will see the importance of it. It is patented by Joseph P. Pirsson of No. 5, Wall street, New York; it is not very expensive, a considerable part of it being cast iron."

Truly, yours, &c.,

WILLIAM SEWELL.

Capt. WM. W. HUNTER, U. S. Navy.

[EXTRACT.]

OFFICE OF ENGINEER-IN-CHIEF, U. S. NAVY,
August 26, 1850.

SIR: * * * * * *

In regard to the desire expressed for a direct and unequivocal opinion of mine as to the value and efficiency of Mr. Pirsson's invention, &c., I have to say:

1st. As to its "value and efficiency," in the total absence of the elements of the number and extent of its applications, the one element of value *pro rata* with the ordinary condenser is alone left, and this, in the point of economy of expenditures, will range as follows:

In the consumption of fuel from 10 to 20 per. cent.

In the construction and repairs of boilers to be from 30 to 50 per cent.; whilst in the more essential point of efficiency, the term of capacity for duration of operation of the vessel may be safely stated at one-third more.

2d. "Of its superiority or inferiority to other contrivances for the same purpose, it presents the essential element of being less liable to disarrangement, with equal efficiency of action, with that enjoyed or claimed, by and for, any other contrivance for the same purpose.

3d. Of "the importance of adopting it in the Navy." It presents itself in the several points of economy, efficiency, and the duration of operation of a naval steamer, in either of which its application, in my opinion, is imperatively called for. As an exponent of the extent of the economy that would be effected by it in the consumption of fuel alone, by the steamers now existing in our Navy, it would induce a saving of tons of coal per diem!

Regarding further the request for an unequivocal answer from this office, I trust that the report of the 3d instant was not otherwise considered, for if so, I signally failed of my purpose, as I have always been anxious to remove cause for a censure so obnoxious to propriety, both in my official and professional communica-

tions ; and with a view therefore to meet this case in the spirit that is asked for it, and aside from any comparisons with either positive or alleged claims, I beg leave to say that, in my conviction, the instrument of Mr. Pirsson, except in the position of the tubes, is **WHOLLY NOVEL, COMPLETE IN ALL ITS ARRANGEMENTS, and EFFICIENT IN ITS OPERATION** ; and that the economy of marine steam navigation renders the application of it, or one of similar capacity and efficiency, positively imperative ; and further, that of such consideration is an instrument for the furnishing of fresh water to marine steam engines, that without the immediate application of it to steam engines in this country, *foreign governments will resort to it, and in the lapse of time there will be accorded to them the credit of an improvement in the marine engine, second only to the original construction of it.*

I am, very respectfully, yours, &c., &c.

(Signed)

CH. H. HASWELL.

To CHIEF OF BUREAU OF CONSTRUCTION,
Washington.

[COPY.]

BUREAU OF YARDS AND DOCKS,
Washington, D. C., August 31st, 1850.

SIR : As you desire me to state my opinion of your patent condenser, I have no hesitation in saying, from an examination of the model, and from the testimonials presented by you from competent persons of its entire success in the steam ship Osprey, that it is the best machine for the purposes for which it is designed I have ever seen, and that *all sea-going steam vessels should be furnished with them for safety, economy, and convenience.*

I am, very respectfully, your obedient servant,

(Signed)

JOS. SMITH.

To J. P. PIRSSON, esq.,
Washington, D. C.

THE REPORT OF ENGINEER COFFEE.

§ GREAT SAVING OF COAL, OIL, AND TALLOW.

STEAM SHIP OSPREY,
Philadelphia, January 25th, 1851.

“ The boilers of this steamship have undergone a thorough exploration, the result of which is, *we found neither the iron plates nor flues in any part injured by corrosion or scales*, and they are, to all appearances, just as good as when they first left the boiler-shop. The workmen declared they had never before seen so clean a pair of boilers after being used; and this is true: for, had we been using salt water, as we should have done if it was not for Pirsson’s condenser, *the boilers would have been badly scaled and much worn by this time*.

“ We next examined the condenser, and the result was equally gratifying with that attending the boilers. *The pipes we found as perfect and in as good condition as when they were first put in*. Indeed, this somewhat astonished me, as I had been frequently told that the pipes would be found furred, or coated with a deposit, which would prevent the steam being condensed. But nothing of a deposit appeared, and the best proof of their cleanliness is, that *we closed up the apparatus, leaving the pipes in precisely the same condition that we found them*.

“ The saving in coal and oil is very considerable. We use now *one* barrel of oil, where we formerly used *three* barrels, and a large quantity of tallow besides. The latter we have dispensed with altogether. *That a steamship is much safer with Pirsson’s condenser than without it, I have been fully convinced by my last year’s experience*; and of this no better evidence is required than the fact that a much greater volume of steam can be produced by the same amount of fuel than when salt water is used.”

(Signed.) GEO. F. COFFEE.

Chief Engineer.

CAPTAIN BAKER, of the STEAMSHIP COMMODORE STOCKTON, now on her voyage to the Pacific, writes thus to the constructors of her engines :

CAVES OF DELAWARE, }
October 31, 1850. }

Messrs. J. T. SUTTON & Co. :

GENTLEMEN : I have the pleasing satisfaction of informing you that the engines of the Commodore Stockton perform as well as any engines of the same power can do. *The condenser works perfectly*, and I believe that it will perform all that Mr. Pirsson guarantees. We are now at the capes of the Delaware, and *our boilers are continuously and amply supplied with fresh water*. This, I consider one of the most important improvements that has ever been introduced on board a steamer, and as soon as it is generally known, no steamer will be built without it."

I am, yours, respectfully,

(Signed) JNO. BAKER,

Commanding steamship Commodore Stockton.

FROM "THE JOURNAL OF THE FRANKLIN INSTITUTE."

In the last number the following notice of Pirsson's Condenser appears: "The Condenser of Mr. J. P. Pirsson, which was noticed in the *Journal* some time since as being in use on board the steamship 'Osprey,' running between this port and Charleston, has been examined within the last few days, while the ship was being refitted for the coming season, *and found to be as perfect as when first put in use*. The tubes, both internally and externally, were found to be perfectly clean, and the *boilers free from scale*."

In another part of the same Journal, amongst the minutes of the proceedings of its Directory is the following: "Pirsson's condensers in the steamship Osprey have just been opened for the purpose of inspection by Messrs. Bartol & Smith, and found to be clean and in good order after a year's constant use, and had given much satisfaction to the examiners."

FROM "THE REPUBLIC" OF FEBRUARY 20, 1851.

NAVAL ECONOMY.

The attention of the scientific world has been directed for several years to devising some mode of supplying the boilers of sea-going steamers with a continuous supply of fresh water. It is admitted that the use of fresh water would effect a great saving; but there have been hitherto mechanical difficulties in the arrangements for furnishing it which have been entirely overcome, it is believed, by Mr. Pirsson's condenser.

In addition to the mass of testimony furnished the Naval Committee at the last session of Congress, we have before us the recent report of the chief engineer of the steamship "Osprey," and a letter to the builders from the commander of the steamship Commodore Stockton, besides the report of the Board of Examiners appointed by the Franklin Institute of Philadelphia, confirming the continuously successful working of Pirsson's condenser, and furnishing some very remarkable facts.

CAUTION.

An effort having been made before the Naval Committee of the House of Representatives, to defeat the proposition to save money to the Government, by another person claiming to be the inventor of this apparatus, the following is a copy of the decision of the Commissioner of Patents in the case:

In the matter of the interference between the pending application of Edward Lynch and the patent granted to Joseph P. Pirsson, for which a hearing was appointed on the first Monday in December, 1850.

The testimony forwarded by both parties having been carefully considered, *priority of invention is hereby decided in favor of said Joseph P. Pirsson.*

(Signed.) THOS. EWBANK,
Commissioner of Patents.

U. S. PATENT OFFICE, Dec. 20, 1850.

[*From the New York Herald.*]

FRESH WATER FOR THE BOILERS OF SEA STEAMERS.

It has been our aim to keep the readers of the *Herald* informed of all progress making in steam navigation ; and, under date of April 19th, we gave an extract from a Philadelphia paper, relative to an apparatus for providing fresh water, which, it stated, had been applied to one of the Charleston steamers from that port, and that so far it had worked admirably. We at once requested one of our correspondents there, who is an able engineer, to look into the matter and report the details, as we well knew the great interest such an invention would possess to our readers. He wrote that the inventor had afforded him every explanation, but had requested that no publicity should be given to facts until several voyages should have been made, and the efficacy of the apparatus fully demonstrated. Our correspondent has now furnished the report requested, from which we take such parts as are of most interest, regretting that we have not space to give it entire.

“ The steamer *Osprey* has an improved condensing apparatus, so constructed that the condensation of the steam, to produce the usual vacuum, is effected without mixing it with the salt injection water, as formerly the case. The steam from all water is of course fresh, and, being reduced to the solid form again, should give back a quantity of water equal to that of which it was originally composed. Some of the steam generated will have been lost by leaks, as at the stuffing-boxes, gauges, &c.; and on this vessel that loss is made up by a very ingeniously arranged evaporator, which is constantly in operation when the engine is in motion, and may also be used at any other time if necessary. The condensed water from both these sources is delivered into a reservoir, ready to be pumped into the boilers by the ordinary feed pump.

“ These are precisely the results intended to have been accomplished by the use of Hall’s English invention, which performed to entire satisfaction, but which, from radical defects in the principle of its construction, it was found could not be kept in order ; the vacuum would be impaired on the slightest defect, and consequently the efficiency of the engine would be destroyed. In the *Osprey*, it was evident to any engineer that if the apparatus should

fail at all, it can only be in the production of fresh water, since the vacuum must still be as perfect as in the usual method of working; the boilers would then have to be supplied with salt water instead of fresh, but this would not involve the necessity of stopping the engine even for a moment.

“The Osprey fills her boilers here with fresh Delaware water, which, by means of the condenser, she uses over and over again until she gets to Charleston, and might as easily continue round the world. At that port she must empty the boilers of the hot water, in order to cool sufficiently to clean the furnaces; and she fills them with the salt water of the harbor, as fresh cannot be had. The evaporator is so effective that a sufficient supply is produced to render that in the boilers perfectly fresh by the time she has reached the capes. The ship has now made some seven or eight voyages, and the boilers are as perfectly clean as when new.

“The Philadelphia and Atlantic Steam Navigation Company are the owners of this ship; and I was informed by the President, A. W. Thompson, esq.; that they estimate the saving of fuel as of very material importance. They are so highly gratified with the performance of the new condenser that they intend to have it attached to the engines of the new ships they are building for the same line. The engineer, Mr. George F. Coffee, expresses himself much pleased with it, as he is enabled to get a better vacuum, and also to keep the water in the boilers at an uniform height. I have to acknowledge the kindness of both those gentlemen for the information here given.

“The alterations were made under the immediate supervision of the inventor, Mr. Joseph P. Pirsson, of New York, who, I learn, has been four or five years in perfecting his invention, and has now patents in the United States, and in the principal countries of Europe.

“I do not hesitate to express the opinion that his invention will yet be the means of *shortening the voyage from New York to Liverpool from one to two days.*”

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OF
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ON
PIRSSON'S CONDENSER,
DELIVERED
IN THE SENATE OF THE UNITED STATES,
AUGUST 30, 1852,
AND
EXTRACTS FROM LETTERS FROM THE NAVY DEPARTMENT.

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The Senate having under consideration the Naval Appropriation Bill, Mr. STOCKTON said:

MR. PRESIDENT: I will endeavor to answer the question proposed by my friend, the Senator from Illinois, and I hope it will be satisfactory. My impression is that Senators do not thoroughly understand this subject, and that the mystery and confusion which has enveloped it heretofore is likely to continue, unless some further explanation is made. Although when this debate commenced I did not intend to take any part in it, yet notwithstanding, I must now ask the indulgence of the Senate for a few moments while I explain, as well as I may be able, the circumstances under which this question comes before the Senate, and the necessity there seems to be that Congress should do precisely what the amendment asks them to do.

A steam condenser capable of supplying a vessel with a sufficient quantity of fresh water for her boilers, has long been a desideratum in ocean navigation. I will not detain the Senate by a dissertation on the steam-boiler or engine; all must know the importance of a condenser at sea, to supply fresh water for the boilers. I will proceed at once to show that Pirsson's condenser

is the best, the very best beyond all question, that has yet been invented, and that experiments, full and ample experiments, have proved it to be all its friends claim for it.

Now, sir, I must be permitted to present to the Senate the following satisfactory testimonials in corroboration of what I have said, and will say, in its favor.

In reference to Pirsson's steam surface vacuum condenser, Messrs. HENRY R. DUNHAM & Co., of the Archimedes Steam-Engine Works, say :

"We gave it as our opinion that the difference of *saving in fuel alone* would pay for it in a few months use. There seems to be, at present, a disposition on the part of the owners of steamers to pay reasonably for any improvement saving fuel, and for the preservation of boilers; *both of which your invention accomplishes.*"

COMMODORE STEWART, whose opinions of such matters has ever been regarded with respect and confidence, says:

"*There has been no improvement conferred on sea-going steamers equal in value to the Pirsson condenser.*"

COMMODORE SMITH, Chief of Bureau of Yards and Docks, says:

"It is the best machine for the purposes for which it is designed I have ever seen, and *all sea-going steam vessels should be furnished with them for safety, economy, and convenience.*"

COMMODORE SHUBRICK, the present Chief of Bureau of "Construction, Equipment, and Repairs," says:

"*The Bureau concurs in this view of the late Secretary, and indulges in the hope that Congress, in consideration of the deficiency of the Navy in the only description of steamers which may be considered at all efficient for war purposes, will put it in the power of the Department to introduce Pirsson's surface condensers into several new propeller frigates and sloops of war.*"

CHARLES H. HASWELL, the late Engineer-in-Chief of the Navy, in an official report to the late Secretary

of the Navy, Mr. Preston, says in regard to Pirsson's condenser :

"It presents itself in the several points of economy, efficiency, and the duration of operation of a naval steamer, in either of which its application, in my opinion, is imperatively called for. As an exponent of the extent of the economy that would be effected by it in the consumption of fuel alone, by the steamers now existing in our Navy, it would induce a saving of 59 tons of coal per diem !"

And again :

"I beg leave to say that, in my conviction, the instrument of Mr. Pirsson, except in the position of the tubes, is WHOLLY NOVEL, COMPLETE IN ALL ITS ARRANGEMENTS, and EFFICIENT IN ITS OPERATION ; and that the economy of marine steam navigation renders the application of it, or one of similar capacity and efficiency, positively imperative ; and, further, that of such consideration is an instrument for the furnishing of fresh water to marine steam engines, that without the immediate application of it to steam engines in this country, *foreign governments will resort to it, and in the lapse of time there will be accorded to them the credit of an improvement in the marine engine, second only to the original construction of it.*"

CHARLES W. COPELAND, formerly Chief Engineer in United States Navy, late Chief Engineer of the Allaire Steam Engine Works, and now an eminent consulting Engineer in New York, says :

"In respect to condensation by metallic surfaces, my opinion has often been expressed that this is the only remedy for many of the evils attendant upon ocean steam navigation. Of the numerous plans that have, from time to time, been brought forward to accomplish this object, *Pirsson's condenser is the ONLY ONE* which is effectual, and at the same time avoids the evils arising from an expansion and contraction of the parts, which has caused the destruction of ALL OTHERS.

"This condenser has been in use for several years, giving the most satisfactory results *in every respect*. From my knowledge of it, I have not hesitated to recommend it for sea-going steamers, and in one or two cases it has been adopted on my recommendation, and the most satisfactory evidence furnished in regard to its operation.

"The advantage of this mode of Mr. Pirsson over the ordinary jet condenser, I conceive to be—

"*First.* A saving of fuel to the extent of at least 15 per cent.

"*Second.* An increased durability of the boilers, not less than 50 per cent.

"*Third.* The labor of keeping the boilers in proper condition, both at sea and in port, is very much diminished.

"*Fourth.* A very great saving in current repairs of boilers.

"*Fifth.* Boilers of a given power would occupy *less room* and *weigh less* in consequence of the "*blowing off*" operation being unnecessary.

"*Sixth.* A much more uniformly efficient vacuum can be maintained at sea with Pirsson's condenser than with any other, and consequently there is not that amount of labor required in attending upon the engines."

B. H. BARTOL, Chief Engineer of Merrick & Towne's Steam Engine Works, at Philadelphia, who constructed one of Pirsson's Condensers for a steamship, says:

"The Pirsson condenser must, I think, commend itself to general favor, for the reason that there is no contingency connected with it that can *cause any delay to the engine*; for if we suppose that the fresh water part should entirely give out, the ordinary condenser still remains uninjured. I am well satisfied, however, that *there is no part of the condenser but will last as long as the rest of the engine.*

MESSRS. JAMES T. SUTTON & Co., of the Franklin Steam Engine Works, at Philadelphia, say:

"*We urged the importance of your invention*, and at our solicitation they have ordered it. Please prepare the necessary calculations and instructions, as soon as possible, that we may get the work under way. Make your estimate so as to give *us an ample supply of fresh water for the ship's use also*, if at any time it should be found necessary."

Lieut. WILLIAM W. HUNTER, U. S. Navy, who has had much experience in steam matters thus expresses himself:

"Pirsson's condenser will cause the same amount of fuel to do *one-third more work* in the propulsion of vessels at sea, and it *will double the durability of their iron boilers*—consequently rendering the boilers less liable to accident from irregular corrosion; and one-third of the tonnage of the vessel, which is saved by economizing fuel, will be available for paying freight.

"In war steamers the advantage gained by the use of Pirsson's condenser is so self-evident that it *should be universally adopted.*"

Chief Engineer, GEO. F. COFFEE, of the steamship *Osprey*, which has had the Pirsson condenser attached since 1849, thus speaks of it:

"The boilers of this steamship have undergone a thorough exploration, the result of which is, *we found neither the iron plates nor flues in any part injured by corrosion or scales*, and they are, to all appearance, just as good as when they first left the boiler shop. The workmen declared they had never before seen so clean a pair of boilers after being used; and this is true: for had we been using salt water, as we should have done if it was not for Pirsson's condenser, *the boilers would have been badly scaled and much worn by this time*.

"We next examined the condenser, and the result was equally gratifying with that attending the boilers. *The pipes we found as perfect and in as good condition as when they were first put in*. Indeed, this somewhat astonished me, as I had been frequently told that the pipes would be found furred, or coated with a deposit, which would prevent the steam being condensed. But nothing of a deposit appeared, and the best proof of their cleanliness is, *that we closed up the apparatus, leaving the pipes in precisely the same condition that we found them*.

"The saving in coal and oil is very considerable. We use now *one* barrel of oil, where we formerly used *three* barrels, and a large quantity of tallow besides. The latter we have dispensed with altogether. *That a steamship is much safer with Pirsson's condenser than without it, I have been fully convinced by my last years experience*; and of this no better evidence is required than the fact that a much greater volume of steam can be produced by the same amount of fuel than when salt water is used."

The Editors of that scientific work, the "JOURNAL OF THE FRANKLIN INSTITUTE," say:

"The Condenser of Mr. J. P. Pirsson, which was noticed in the *Journal* some time since as being in use on board the steamship '*Osprey*,' running between this port and Charleston, has been examined within the last few days, while the ship was being refitted for the coming season, *and found to be as perfect as when first put in use*. The tubes, both internally and externally, were found to be perfectly clean, and the *boilers free from scales*."

EDWARD K. COLLINS Esq., of the *Collins line* of steamers, says, August 18, 1852, a few days since:

"*Having for a long time entertained a favorable opinion of Pirsson's condenser, I have taken much pains to get every in-*

formation I could respecting it, and I am happy to say that my opinion has been so fully confirmed, that I SHALL PUT IT IN THE NEXT STEAMSHIP I BUILD."

GEORGE W. ASPINWALL, Esq., who has had the Pirsson condenser in use on three of his steamers thus closes a letter recommending it:

"I can only say I never would send a steamship to sea without the Pirsson condenser, securing as it does so GREAT A SAVING IN ALL RESPECTS."

Now hear what Chief Engineer ROANE, of the steamship "Quickstep," says of the advantages of Pirsson's condenser, in a letter to the constructors of the engines, Messrs. Reany, Neafie & Co., he remarks:

"Can you point to any steamship which has ever steamed continuously for forty-five days, under a constant pressure of forty pounds of steam to the square inch; part of the time, too, in the saltiest of oceans, without ever blowing one drop of water from her boilers, or once drawing the fires? This was done in the Quickstep, and much more."

At another part of the letter he says:

"The vessel was very deeply laden, and we encountered very heavy weather; yet not the slightest accident occurred to any part of the machinery, as on a survey at that port every thing was found in perfect order. The boilers and condenser were absolutely as perfect as when they left your works. The rest of our voyage was accomplished with like results."

"Here let me stop for a moment, and consider what has been done. A small steamer, (550 tons,) of inferior power, laden to the water's edge, leaves the wharf at Philadelphia—passes twice through the tropics—through the Straits of Magellan—steams on continuously for some twenty thousand miles, on two occasions of periods of forty to fifty days, not having a fire drawn from her boilers—arrives at her port of destination as perfect as at the start, ready for a new cargo, and not a place to spend a shilling upon the engines or boilers if you would!"

But I have not half done with stating the remarkable things performed by the condenser or resulting from it. One of the most gratifying was the *vacuum*, and the temperature of the feed water. The vacuum gauges were open syphons, hence affected by every change of the atmosphere. When the barometer stood at thirty inches, the mercury in the short leg of my gauges stood constantly at $14\frac{1}{2}$ inches below equilibrium, or *equal to a vertical column of 29 inches*, and feed

water, according to the temperature of the ocean, was from 150° to 160° F."

Again he says:

"Some amusing incidents occurred on the voyage. My assistants had very poor faith in the condenser when we left, and prophesied all manner of difficulties. My first assistant stuck to it that the pipes would all choke up. At Rio I was taken sick, and while unable to do duty he opened the caps to examine the pipes. His astonishment and disappointment on finding nothing there was very great. He said he could hardly believe it possible that it should be in such perfect order. I was constantly visited by engineers in every port, and from steamers of all nations. Their surprise on examining the admirable condition of my boilers was unbounded, and they would constantly contrast it with that of their own, *many of which were badly scaled and burnt, and undergoing costly repairs.* An old Brazilian officer who came to see me said, after a long and careful examination, 'I knew that if this was ever found out, it would be some Yankee that would do it; it is a great thing.' And so I say, *it is a great thing*; and you will never find me operating an engine without one, if I can help it. If any engineer would say otherwise, *let him look at the crazy and unsafe condition of the boilers in the Pacific* at this time, especially in the pioneer steamers. All those might now have been sound and strong, had Pirsson's condensers been on board."

Mr. *Aspinwall*, the owner of the *Quickstep*, in a letter dated July 22d speaking of Mr. Roane, says:

"You may count him as a very reliable, excellent, and faithful man, and one in whom you can confide. I highly recommend him as a good mechanic and engineer, and a trustworthy man. He served seven years with Messrs. Stillman, Allen & Co., of the Novelty works.

Further important testimony is afforded by Chief Engineer BUCK, of the steamship "*Albatross*," who has had a long experience with Pirsson's condenser. He says, among other things:

"The greatest consumption of coal with the fresh water apparatus has been, and now is, TWELVE tons per twenty-four hours, and the boilers were always kept perfectly clean; while, however, we were using salt water, as we had to do with the jet part of the condenser, the consumption of coal WAS INCREASED ABOUT SIX TONS *per twenty-four hours*, and *the whole interior surface of the boilers became covered with scale, while the speed of the engine was also materially diminished by reason of a deficiency in steam.*"

Again, he adds:

"The action of the fresh water has separated the scale which had formed inside of the boiler, and the quality of the water supplied by the condenser is so pure and fresh that I would cheerfully compromise for no worse for drinking while at sea."

Then comes the testimony of Chief Engineer SIMON BAKER, who had charge of the steamship "*Commodore Stockton*," from Philadelphia to San Francisco, and for many months afterwards in the Pacific ocean. He says:

"On our arrival at San Francisco, a searching investigation into the condition of our machinery, boilers, and condenser, was instituted, and it was universally admitted that no steamer had ever arrived there in such perfect condition. It seemed to astonish the engineers of other steamers there as much as it pleased me, although my previous experiments with the condenser had satisfied me of its inestimable value.

"I am now about to return home, and I leave the *Commodore Stockton* at this port, with her machinery in the most satisfactory condition. *The boilers and the condenser are as perfectly clean and free from scale or deposit of any kind as when they were first made, and not a single dollar has been expended on the boilers*, notwithstanding they have been in constant service for nine months. I know of no other boilers which have been in use on this ocean for three months, that are not covered with scale, and many of them that have been in use for two years are entirely destroyed.

"Our boilers have been constantly supplied with fresh water and a vacuum regularly maintained at 27 inches; the feed water returned to the boilers at 118°, and has scarcely ever varied from this temperature. When we left Philadelphia we were burning bituminous coal, and consumed $4\frac{1}{4}$ tons (accurately weighed) per 24 hours, carrying 34 and 35 inches pressure of steam, and working at full stroke. In order to test more fully the advantages of the condenser, as you desired, in going to Rio Janeiro, I shut off the fresh water apparatus, and used your condenser as a common jet condenser. Here the incalculable value of the apparatus was made very manifest. The consumption of coal was increased twenty per cent.; and the temperature of the feed water was reduced nearly 15 degrees, and the vacuum fell and became very irregular. The difference between your fresh water apparatus and the ordinary condenser is here shown by the steadiness of the vacuum; because, through all the changes of the temperature even, the vacuum was preserved at 27 inches, whilst by the ordinary condenser I could not manage to obtain a steady vacuum under the most favorable circumstances."

And he thus ends his letter:

"In conclusion, I would assure you that if engineers generally were acquainted with the value of your condenser, they would go to sea in no steamer to which it was not attached. As to the pecuniary saving, it is too large for owners of sea-going steamers to disregard, as they can be run at so much less expense, that no vessel without them can successfully compete with those having them on board."

Mr. THOMPSON, the President of the *Atlantic Steam Navigation Co.*, thus speaks of Pirsson's condenser:

"It will at all times afford me pleasure to aid in the extension of the use of the condenser, for two reasons: First. It is a great private benefit to the owners of steamers, because it makes them more economical, and will therefore tend to increase the steam marine, and extend commerce. Second: It is a public good, because *it preserves the strength of marine boilers, and tends greatly to the safety of those on board such steamers as use it.*"

Then comes engineer SAMUEL GENTHER, of the steamship "Utah," who says:

"I have had charge of the Utah since she was built. Pirsson's patent condenser is attached to the engine, and operates in the most satisfactory manner, furnishing an abundant supply of fresh water to the boilers. I have condensed steam at 40 pounds to the inch, whole stroke, when the water was at a temperature of 70° F., and obtained a vacuum of 26½ inches, and fed water 150° to 160° F. Maximum consumption of coal *three and a half tons per 24 hours.*

"I have been visited by many engineers, some of the most prejudiced against the introduction of new things, *who have unanimously expressed themselves satisfied with the perfection of your arrangement.*

"From my experience, I am prepared to make this offer: I will guarantee to take any well-constructed steamship round the world, and return to port with the boilers in the most perfect condition, as far as any deposit of scale or corrosion is concerned, provided your condenser is properly applied on board. On this I will stake my professional reputation."

Finally, we are placed in possession of the testimony of a board of the most experienced practical steam engineers of the Navy, who were recently appointed to examine the whole subject of condensation, and they state:

"*We consider Pirsson's to be the best surface condenser known, for the following reasons:*

"No surface condenser can be safely or judiciously used except it contain a provision, or is so arranged, that it can instantaneously, and at will, be converted into a common jet condenser, in the event of fracture or other derangement of the pipes, parts, &c. A surface condenser must possess, therefore, this important property; if this be absent, other merits may deserve admiration, but cannot recommend it as practical; and here we fully agree with the commission in the following opinion, viz: "that we would not be willing to trust a vessel of our own property without a full provision for a resort to an ordinary injection condenser, and which we cannot but consider as a *first and most essential* point in any device of the kind." This important requisite, the commission truly states, belongs to Pirsson's condenser, and they attribute it to Symington's. *Pirssons, however, is the only condenser presenting the new and important features of the DOUBLE VACUUM*, by which the condensing surfaces are relieved from the atmospheric pressure, and consequently strain and leakage, causes *alone of the failure of all other plans* of surface condensation. This is not the case with Symington's condenser, mentioned by the commission in connexion with Pirsson's, as affecting the same objects. Symington's has a *single* vacuum, and if used as a surface condenser, has all the disadvantages of the atmospheric pressure on the pipes, similar to Hall's Miller's, and others.

"*Question 4.* Is it advisable to make the application of the most approved condenser to all steamers of the Navy?

"*Answer.* We are of opinion, that, for the reasons hereinbefore stated, *it is advisable to apply, as soon as practicable, THE CONDENSER OF PIRSSON, as now being fitted to the United States steamship "Alleghany," TO ALL STEAMERS of the Navy, plying in sea water.*

"This condenser has already been applied to eight merchant steamships; it has been in use in some of them for several years, and the practical results fully bear out our estimate and opinions. There are also two large steamships now being fitted with it at New York.

Mr. President, in addition to all this, we have a letter from the Secretary of the Navy, stating that a board of examiners had investigated the merits of Mr. Pirsson's and several other condensers, and that they had found none of them perfect—all might be improved. For all practical purposes this report was quite useless; it could have no influence to guide the Se-

cretary. Since that examination and report, however, there have been experiments made which prove that this condenser entirely answers the purpose intended; and is beyond all kind of doubt, the best that has yet been used in our navigation, and is an instrument by which hundreds of thousands of dollars may be saved to the United States within the coming year, provided all our own steamers can be supplied with it. This practical demonstration in its favor, blowing to nothing the conclusions of scientific examiners, so bothered the Navy Department, that the Secretary would take no action on the subject without the authority of Congress.

Sir, the opposition outside of this Senate to the use of this condenser, has been untiring, and is as groundless as it seems to have been interested and vindictive. Various means have been adopted by persons outside of the Senate to destroy or disparage Mr. Pirsson's invention, and to alarm and excite the Navy Department and members of Congress. The most absurd reports have been circulated, which have contributed to embarrass the Secretary. I hope the Senator from Illinois is answered.

I did hope that it would not be necessary to detain the Senate by going so far into the merits of this machine. I did hope that all that would be necessary to satisfy any one, even my friend, the honorable Chairman of the Committee on Finance, would be, that it was recommended by all the Chief Engineers of the Navy, by the head of the Bureau of Construction, by the Secretary of the Navy, and by the unanimous recommendation of the Committee on Naval Affairs, who, after a careful examination, do advise its adoption in the Navy. Is there not something due to this careful examination of the subject, something due to all these opinions expressed in the decided way in which they have been expressed?

Again, amongst the evidences of the superiority of Pirsson's condenser—and that his condenser is likely to answer the purposes for which the Secretary is to be authorized to use it, there will be found in the testimony that has been presented to the Naval Committee, a statement of the engineer of the "Quick Step," on board of which this condenser had been used. That vessel went to California from Philadelphia. She made one continuous passage, except when she stopped for coal, and her boilers were supplied with fresh water from the time she left Philadelphia till she arrived at San Francisco. On her arrival at which place, her engine and boilers were examined, and they were found to be not only in good order, but absolutely as perfect as when she left Philadelphia. Now, sir, I will ask whether this well authenticated experiment does not justify the recommendation of the Secretary of the Navy, of the Bureau of Construction, and of the Naval Committee, in a way so as to leave no doubt as to the expediency of immediately applying this condenser to the Navy.

If Senators are resolved to disregard these incontestible evidences of the value of this machine, in consequence of information they have got from other, and perhaps, not the most honorable or disinterested parties—if they are determined to put down the recommendation of the Secretary of the Navy, of the Bureau of Construction, and the unanimous recommendation of the Naval Committee, in consequence of what they have heard outside of the Senate, let them do it. I shall do my duty. I stand up here as a member of the Naval Committee, to defend the recommendation of that committee, and I place my reputation, not only as a member of that committee, but the little professional reputation I have, on the statement that the Pirsson condenser will be found to answer better than any other heretofore used.

Mr. President, what do gentlemen, in the face of these experiments and recommendations, propose? Why, that this subject should be passed over for the present, and that all the boilers in your steamships shall continue to use salt water for the next year, to their great expense and detriment. The boiler of the vessel to which I have alluded, when examined at San Francisco, after a continuous voyage of 20,000 miles, was found to be perfect, and in the language of the engineer, "not a place to spend a shilling on the engine or boilers if you would;" and I say that if the ordinary condenser had been used, it would have cost many "shillings," if not half the original cost of the boilers to repair them.

Sir, why should this amendment not be adopted? Gentlemen say because there is some doubt on the subject. I say there ought to be no doubt—there will be no doubt in the world on the mind of any candid inquirer, that this is the best condenser that has ever been used. The Secretary of the Navy did not doubt—the Naval Committee do not doubt—and we come here this morning, all of us, and ask you to direct the Secretary of the Navy to use it. We ask this authority because, in consequence of various reports and suggestions made to him, the Secretary feels constrained to hesitate, lest he might incur too great expense without the authority of law—and we ask Congress to authorize him to do whatever he may see fit to do, and pay whatever he may see fit to pay for its use. Surely, sir, we do no more than our duty. This is not an unreasonable request to be made to Congress. But gentlemen say that this machine may be improved, may be made better. We certainly admit that it may be made better, but we also say that until you do get a better one, in the name of common sense and prudence adopt this,

which is admitted to be the best now in use, and will save to the Government a large amount of money.

If Senators are not yet satisfied, nothing remains for me to do but to make a long scientific discussion on the subject of marine engines, and the use of coal, to show the absolute necessity that something should be done to reduce the enormous expense of your steam navy; gentlemen do not appear to understand much about steam navigation, and I fear it would take more time than the Senate can well spare to make them comprehend it fully. My belief is, sir, and I stake my standing here in the Senate upon it, that if you adopt this condenser on all your steamships, you will save nearly \$200,000 a year by the operation. In the hope that I have finally satisfied my friend from Virginia, the chairman of the Committee on Finance, as well as other Senators, as to the importance of this measure, I will detain the Senate no longer.

The debate having been continued by several Senators, Mr. STOCKTON rejoined and said:

If my friend from Illinois desires another answer to his interrogatory, from me, I will give it. I intended to do so when I last addressed the Senate. I thought I stated that the Secretary of the Navy wanted authority to use this condenser, in consequence of the difficulties and confusion which have been thrown in his way by persons interested in other condensers, and especially because the report made by scientific gentlemen who were appointed for that purpose, was not sufficiently definite or conclusive. The Secretary did not feel himself at liberty to go on in so important a business without authority of Congress. It will be perceived that this has been forced out of the ordinary course of departmental regulation, by the interference

of persons not at all connected with the navy, and who are interested in other condensers. What we ask is merely to disembarass the present Secretary from the difficulties that seem to have constrained the action of his predecessor.

Mr. CASS. Do I understand that the report of the board was unfavorable to the application?

Mr. STOCKTON. It was more favorable to this than to any other condenser, but not conclusive.

Mr. CASS. But still not entirely favorable.

Mr. STOCKTON. I wish to be perfectly understood. The board thought, as I understand the report, that the Pirsson condenser was the best; but that parts taken from several condensers, might possibly make a better one than his. I have in my hand papers which prove that I am not mistaken.

Mr. SHIELDS. No doubt of it.

Mr. STOCKTON. Now, sir, as a legislator, called upon to determine what is the best course for the Department of the Navy to pursue under the circumstances, and especially, as a member of the Committee on Naval Affairs, I am constrained to insist, with earnestness, that this amendment ought to be adopted by the Senate. Our steam navy is costing annually, too much money, and I believe we may reduce its expenses \$200,000 a year, by a judicious application of this condenser to all the engines. Is that not a matter of importance? How is this conclusion to be avoided? How can Senators satisfy themselves to let the present expenses go on, simply because the commission did not report that this condenser was perfect, and incapable of improvement; they reported more favorably of this than any other condenser, the only difficulty in their minds seems to have been, that they thought another one might possibly be made better than Pirsson's; when such a

one is made we can use it. But in the meantime let us apply this.

Mr. President, I have given you the experience of persons who are engaged in steam vessels in the mercantile marine—men who are apt to do that which is best; especially that which is most economical. I cited in my former remarks, the instance of the “Quickstep” steamer which went to California, and stated that on her arrival there her engines and boilers were in as good condition as when she left Philadelphia. This is no exaggeration: the evidence in my hand proves it. Upon so serious a subject as this I am disposed to confine myself within the limits of exact figures.

Here is a letter from the engineer of that steamer to which I have before referred, stating these facts, and his great surprise at the result. Here is also a letter from Mr. George W. Aspinwall, owner, or part owner of that vessel. Here, likewise, is a letter addressed to myself, from eminent and skilful mechanics, Reany, Neafie & Co. in Philadelphia, written to me simply because they knew I felt an interest in such experiments.

Now, I think if Senators have faith in any human testimony—if they can believe what is testified to by the most reliable men, they must believe the concurrent testimony of these witnesses and they must come to the conclusion that this is the best condenser now in use or known. If this be still a disputed fact, then we must go further into the testimony. But I do not think it can longer be doubted. Admitting, then, that it is the best condenser—admitting that it has done much to economise fuel, and preserve the boilers and engines, I ask Senators if they can resist the conclusion, that it is their duty to give the Secretary of the Navy authority to use it if he sees fit, and enable him to reduce the expenses of our naval marine. Sir, as a friend of the

Navy—as a friend of economy—as a friend of improvement and of progress, I ask Senators to reconsider their opinions—to do justice to an honorable and useful citizen, and to vote for the amendment.

individuals who contract for the others, to furnish them by the time that the one here is finished. A wholesome emulation would thus be excited between the workmen in the public workshops, and those in the workshops of individuals.

Extract of a letter from COMMODORE SHUBRICK, Chief of the Bureau of Construction, Equipment, and Repairs, to the Secretary of the Navy, of May 8, 1852:

The hope was indulged that, in view of the fact that the United States is so far behind all other powers, having any claim to Naval respectability, in its steam Navy, and especially in that description of force which is acknowledged to be the most efficient for war purposes, the screw propeller, an addition for increase, &c., would have been made to the estimates from the Bureau, that an opportunity might be afforded to the Department to call into exercise in the public service some of the genius of the country, in the application of a power which is destined without doubt to be the great fulcrum of Naval strength, and one *short step* taken towards a state of preparation becoming a nation having a commerce so wide spread and so valuable as is that of the United States.

The fact is already before the Department that we have, at the different Navy-Yards, quantities of materials suitable for steamers, in the frames, purchased years since for frigates and sloops-of-war. *An appropriation to meet the expense of labor, and to purchase or construct steam engines and machinery*, would be all that would be required at this time for a purpose so desirable.